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THE PROTEIN REQUIREMENTS OF INFANTS

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How much protein does a baby require? How much should be given "to play safe"? These questions are not readily answered, and they have given rise to a controversy in pediatric and nutritional circles. In the current table of recommendations of the Food and Nutrition Board[1] a blank space for this item is found, with a reference to a footnote which attempts to straddle two schools of thought and of practice.

Let us examine the evidence which bears upon this question. The healthy breast-fed infant commonly receives between 2.0 and 2.5 grams of protein per kilo per day. It is generally admitted that during the first 6 months of life the infant so fed receives an adequate protein intake. How much above the minimum requirement such a protein intake provides is not accurately known. It probably provides about 25 per cent above the minimum, as judged by the report of Beach, Bernstein and Macy.[2] They describe excellent clinical response in infants receiving only breast milk by bottle with protein intakes around 1.65 grams per kilo.

The quality as well as the quantity of milk protein must be considered in meeting requirements. A larger intake is required to the extent that the quality of the protein is inferior to that of breast milk. The questions then arise: To what extent is cow's milk protein inferior to breast milk protein in nutritive quality? How much more protein should be given to the artificially fed infant than the breast-fed infant receives?

Historically there was reason for the belief that cow's milk protein was inferior and that more protein should be given to the artificially fed infant. In the days when raw cow's milk was fed, a considerable fraction of the casein was undigested and appeared in the stools in the form of bean-like curds. There was also the experimental evidence of Osborne and Mendel[3] indicating that casein, which is more abundant in cow's milk, was an inferior protein for the growing rat. Only when supplemented with cystine did it equal the performance of lactalbumin. The pediatricians of a generation ago found it beneficial to give higher protein intakes to bottle babies, with intakes of 3.0 to 3.5 grams per kilo recommended.

There is now reason for questioning the need for these higher intakes. Bottle babies are routinely fed sterilized milk formulas and the problem of curd indigestion has vanished. The classical experiment of Osborne and Mendel has been challenged in relation to man. The most recent assays[4] of the "biological value" and the "net protein utilization" (N.P.U.) value of breast milk and of cow's milk have shown only minimal differences.

In recent studies on premature infants, Snyderman and Holt[5] were able to obtain normal weight gains and excellent clinical responses with feedings of processed cow's milk containing 2.0 grams protein per kilo. The superiority of either 2.5 or 3.5 grams protein per kilo for the young infant cannot be established on clinical grounds. Infants appear to do equally well on both.

Interesting differences have been observed, however, in experimental animals fed different levels of protein which may have relevance for the human species. These differences come under two headings: differences in body composition, and differences in resistance to various stresses.

During growth the body becomes richer in nitrogen and poorer in water content. This change seems to be accelerated by a relatively high protein intake. Those who believe in generous protein intakes maintain that this earlier attainment of "chemical maturity" is probably accompanied by a measure of "functional maturity" in terms of resistance to disease or stress. It has not been demonstrated that this latter desirable result can be accomplished by higher protein feeding.

The real test of the merits of higher protein feeding concerns the resistance to stress. And here the data from animal experiments conflict. The popular concept that more protein must mean better resistance is, as Schneider[6] put it, a matter of reiteration rather than of demonstration. A more generous supply of a nutrient may benefit the invading parasite more than the host. As a rule, to which there are exceptions, bacterial infections seem to be best resisted on higher protein intakes but the reverse is the case with a number of viral infections. In the resistance to poisons, the nature of the poison makes a great difference. For some poisons, resistance is best on a high protein diet, in the case of others a high fat or a high carbohydrate diet is more effective.

Dr. Holt, Jr.

Other types of stress have been studied in animals, with conflicting results. Because nitrogen retention is favored by a higher protein intake, it has been presumed that such nitrogen acts as a reserve to protect the body from subsequent protein deprivation. The available data fails to show that retained nitrogen functions in this way. When protein is withheld from an animal with such "reserves" he loses nitrogen more rapidly than a control animal without the reserve.

We do not know enough at the pres-

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Glances AT NUTRITION RESEARCH

Protein and calorie malnutrition in preschool children occur frequently in technically underdeveloped countries. This complex problem is being studied in terms of emergency therapy, clinical manifestations, and long range plans for prevention.

World nutrition problems—The rapidly growing young of any species are sensitive to nutritional deficiencies. Therefore inadequate food supply has its most devastating effect on children. Protein deficiency is commonplace in technically underdeveloped regions bringing with it retarded growth and development, susceptibility to infection, and high mortality. Kwashiorkor is protein malnutrition, reported from 64 parts of the world. Sources of low-cost protein under investigation are fish flour, soya and sunflower seed press cake, and peanut flour. Skim milk, made available through UNICEF, is the dietetic therapy of choice in the treatment of kwashiorkor and marasmus.

—*J. Am. Dietetic Assoc., Vol. 35, No. 5, p. 441, (May) 1959.*

Plans for increasing protein production—Long range plans for the prevention of protein deficiency problems in preschool children are complex. National governments and agencies such as WHO, FAO, and UNICEF are concerning themselves with portions of the task. The general standard of living, health education, family planning, and improvement of a country's protein production are several aspects of the total problem. Increasing the national production of protein by tropical dairy farming includes the use of new breeds of cattle which are relatively high milk producers and which are capable of withstanding hot weather.

—*Pediatrics, Vol. 54, No. 2, p. 227, (Feb.) 1959.*

Dietary allowance of protein for infants—is difficult to determine. Human subjects do not appear to store unorganized protein. Consequently, an inadequate daily protein intake has the effect of preserving the health of one protein tissue at the expense of another. Infants receiving a cow's milk formula, which furnishes more protein than breast milk, enjoy no special dietary advantages such as growth, resistance to disease, rate of survival, state of health, or recovery from illness.

—*Pediatrics, Vol. 23, No. 2, p. 384, (Feb.) 1959.*

Mineral deficiency in kwashiorkor—Ten Guatemalan children suffering from kwashiorkor were found to have abnormally low blood levels of iron, copper, and a low iron-binding capacity of blood serum. Because the children meet no primary dietary deficiency of iron, the abnormal blood values are thought to result from alterations in the metabolism of these minerals secondary to protein depletion. Similar phenomena occur in swine with protein deficiency rations.

—*Pediatrics, Vol. 22, No. 1, p. 72, (July) 1958.*

L. Emmett Holt, Jr.

L. Emmett Holt, Jr., M.D., Ph.D., received his medical degree from Johns Hopkins Medical School and was for many years associated with the department of pediatrics in that institution. Since 1944 he has been head of the department of pediatrics at New York University College of Medicine. His research interests have been largely in the field of infant nutrition—the metabolism of calcium and phosphorus, fats and most recently in establishing the requirements for B vitamins and essential amino acids. Dr. Holt is active in many scientific societies and has contributed extensively to medical and technical journals as well as to mass circulation consumer periodicals.

Golden Anniversary

The 50th Anniversary White House Conference will be the 6th White House Conference on Children. On March 27, 1960, 7,000 participants will meet in Washington to consider the needs of children in a changing world.

Conference members will study how family, religion, the arts, government, community organizations and services such as health education and welfare, and the behavior of adults in the interaction with children and youth deter or enable individual fulfillment.

Youth Power Congress

The National Food Conference, a group representing the areas of food production, processing and distribution, have been busy planning a National Youth Power Congress. They will emphasize better eating habits for our nation's teen-agers as the Congress gets underway on February 11, 1960, in Chicago, Illinois.

EMOTIONAL AND NUTRITIONAL PROBLEMS OF WEANING

By Mrs. Mary Alice Tarulli, Director of Nutrition
The Infant Welfare Society of Chicago

One of the most challenging problems for any public health nutritionist is motivating people to improve their food habits. This can be achieved when her co-workers, the nurses and the doctors, are also aware of this challenge and work through combined effort to improve family nutrition.

The Infant Welfare Society of Chicago gives health service to pregnant mothers, infants, and preschool children. Working together, the nurse and the nutritionist try to help the mothers understand what foods her family needs and how she can meet these needs on her limited income. Since we are attempting to change the individual's food habits it necessitates a great deal of understanding and teaching to achieve this goal.

Today an increasing problem with which we are faced is that of 2-4 year old children who have not yet been weaned; children who eat almost no solid food but are seldom without a bottle in their hands. Yet, the quantity of milk which these children receive in a 24-hour period rarely exceeds one quart. The picture they present is of pale, forlorn, quiet children, slightly underweight and with poor muscle development. When it is possible to persuade the mothers to have blood analyses done on these children, they are diagnosed as being anemic.

There seem to be many reasons why this problem exists among the families with which we work. We feel the main reason is the mothers' lack of understanding of the nutritional and emotional needs of her children.

Another reason is the cultural background of the majority of these families, who have come to Chicago from Mexico, Puerto Rico and the southern part of the United States. We have found that many of the people from these cultures do not attempt to introduce solid food and milk from a cup until the children give up the bottle voluntarily. Also, it is easier for the mother to give children a bottle than it is to wean them, especially if she has had one or two babies since the birth of the pre-school child.

We attempt to solve this problem by reassuring the mother that children do need this quantity of milk but that it should be offered at intervals in order for the children to have an appetite for other foods at mealtime. Taking into consideration the social situation, the nationality and the cultural food preferences of the family, we explain the variety and quantity of foods that children need in order to grow and be healthy. Simultaneously, the nurse tries to develop in the mother an understanding of the emotional needs of children during this difficult time.

Our specific suggestions are the time-honoured ones: (1) Offer milk from the cup at meals or after the meal. (2) Continue to give the bottle at nap time and at bed time. (3) Gradually put less milk into these two bottles. (4) Next, eliminate the nap time bottle. (5) And lastly, eliminate the bed time bottle.

Weaning from the breast or the bottle to the cup is the first habit that children are called upon to change. Most infants protest this change but some more vigorously than others. Our experience has been that happy, healthy infants will eat almost any food that is given to them if it is in a form which they can swallow easily. All infants need love, understanding and gentle support at this time in order that they can make this change as easily and happily as possible.

ENVIRONMENT AND FOOD HABITS

By Stella Young, Chief Dietitian
Intermountain School, Brigham City, Utah

The Navajo reservation, about the size of the state of West Virginia, lies in the region where the four corners of Arizona, New Mexico, Utah and Colorado meet. This is an arid and unproductive land.

The small Navajo hogans (homes) which blend into the landscape are for the most part widely separated. Some areas are extremely isolated. Many families must haul every drop of water they use great distances by wagon. The water is stored in wooden barrels.

Grazing of dairy cows has not been practical because of the sparsity of grass. Small flocks of sheep and goats must graze farther and farther from the hogan as the grass is eaten. These furnish some milk and, together with wild rabbits and prairie dogs, provide most of the meat supply.

The traditional Navajo diet naturally reflects this environment. Foods which can be produced on the reservation are obviously limited, yet the Navajo has always had an uncanny sense for making the most nutritionally of these available foods. In the preparation of animals no part is discarded—glands, blood, stomach, intestines, tongue, eyes, muscles, are all eaten.

Intuition also serves the Navajos in including such important protective foods as the wild leafy plants, seeds, cactus and yucca fruits, wild berries, pinon nuts and wild walnuts in their diets. They are ingenious in contriving ways to make these foods more palatable. A white clay found only in a few localities is gathered and ground by hand between stones. This powder, when mixed with wild potatoes, counteracts the astringent flavor and makes them more appetizing.

On the reservation, Indian corn is a universally cultivated crop. It is grown with difficulty and uncertainty in small patches. Corn is used in a variety of ways—as a beverage, cereal, vegetable, and bread.

Fresh cow's milk is not to be had on the reservation. The limited quantity of milk from sheep and goats is seasonal and is usually reserved for the very young. With the coming of the trading posts, coffee, sugar, fat and white flour have become staple foods in the diet of many Navajos. These foods tend to replace many of the protective foods in the traditional diet. Studies reveal that the teeth of Navajo children today, reared in isolated areas, on the traditional diet, are excellent. In sharp contrast, those eating the refined foods show marked deterioration.

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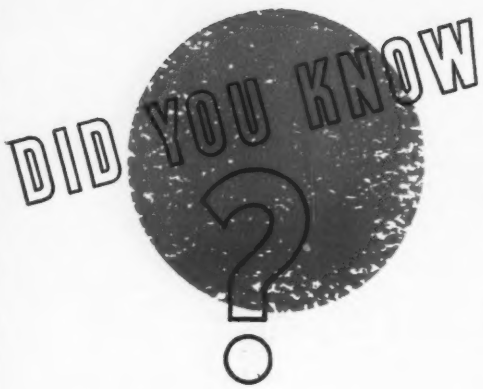

—a Hindu proverb reminds us that the poor seek food, the rich seek an appetite?

—that contrary to the expectations of many school executives, installation of vending machines increases the use of milk through the School Lunch Program?

—that a Harvard School of Public Health study on why mothers breast feed babies found college women are more apt to nurse their offspring than are other mothers?

—that the first ice cream cone was made by rolling up a waffle to hold a ball of ice cream?

—that the evidence we have of man's first million years is to be found in the calcium-bearing bones and teeth he left behind?

—that Napoleon had all of his meals cooked in butter?

—that the cost of the nutritional elements in a quart of milk would be over 40 cents if duplicated in other foods?

—a survey by the Society of Actuaries found the average man to be 5 pounds heavier than the average man of the same height in 1929, but the average woman was about 5 pounds lighter, and that reducing weight does prolong life expectancy?

THINGS YOU'LL LIKE TO READ

Health Education in Schools—3rd Ed. Ruth E. Grout. Philadelphia: W. B. Saunders. 1958. $4.75.

This revised third edition offers basic information on the health needs of today and the developments in audio-visual education are well presented. Emphasis is on "how and what" to teach with many points of view being contributed by teachers and school administrators from different parts of the country.

Source materials, suggested learning experiences, and the teachers place in group health education are outlined in the appendix. This book is important for any elementary or secondary school group intent on revising or setting up a new health education program.

Food Values In Shares And Weights—2nd Ed. Clara Mae Taylor. New York: MacMillan. 1959. $4.00.

This enlarged edition is more than a collection of tables on the nutritive values of food. The book reviews briefly the functions of essential nutrients; gives directions for estimating personal calorie requirements and recommendations for setting desirable intakes of protein, minerals and vitamins. There are suggestions on how to gain or lose weight. The appendix contains height-weight tables for all ages and growth curves for school age boys and girls. All those who deal with the problems of food and nutrition will find this a valuable reference.

ENVIRONMENT AND FOOD HABITS

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At boarding schools the Navajo boys and girls are confronted with many strange foods. Cow's milk, butter, green vegetables (especially when creamed), and milk puddings present particular problems.

The children at Intermountain School receive a well-balanced diet of simple, nutritious foods. Navajo favorites are combined with the unfamiliar foods nutritionists feel are essential under modern living conditions. The school menus are studied in classrooms, and the teachers arrange for "tasting parties" in an effort to favorably precondition the students to the foods they will encounter in the dining room.

Their white bread is a soya loaf made especially for the school. A half pint of milk is included in every meal. Milk is also served several times a week as an evening snack in the dormitories. Having the milk refrigerator-cold and drinking it through a straw seems to make acceptance easier. Most of the children soon learn to enjoy drinking milk and eating the unfamiliar foods.

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ent time about the effects of various levels of protein intake above minimal protective levels. The long term effects of such diets need to be evaluated and many more studies on short term stress are needed. One can only commend the wisdom of the Food and Nutrition Board in refusing to state recommended protein allowances for the child under twelve months of age.

1. *Recommended Dietary Allowances. Publication No. 589. National Research Council, Washington, 1958.*
2. *Beach, E. F., Bernstein, S. S. and Macy, I. C.: Intake of Amino Acids by Breast-Fed Infants. J. Pediat., 19:190, 1941.*
3. *Osborne, T. B. and Mendel, L. F.: The Comparative Nutritive Value of Certain Proteins in Growth and the Problem of the Protein Minimum. J. Biol. Chem., 20:351, 1915.*
4. *Tomarelli, R. M. et al.: Bioassay of the Nutritional Quality of the Protein of Human and Cow's Milk. J. Nut., 68:265, 1959.*
5. *Snyderman, S. E. et al.: Observations on High and Low Protein Diets. A.M.A.J. Dis. Child., 96:631, 1958.*
6. *Schneider, H. A.: Nutrition and Resistance to Infection. The Strategic Situation. Vitamins and Hormones, 4:35, 1946.*